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## The Efforts of Arab and Muslim Scientists in Pharmacy, Practically and Theoretically - Treating Poisons as an Example

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**ABSTRACT:** Pharmacy is considered a science and a profession in all human civilizations. Toxic substances are considered health problems that many people face and require prevention and treatment. Arabs and Muslims, in general, have shown interest in pharmacy, and specifically in toxins, both practically and theoretically. This is the focus of this research, which aims to introduce the science of pharmacy, highlight the efforts of Arabs and Muslims in it, especially in combating toxins through prevention, treatment, classification, and definition. The research also aims to introduce some of the works they have written in this field and assess their usefulness, using a descriptive-analytical approach and a historical approach to trace the significant contributions of Arabs and Muslims in pharmacy and toxins over time. The research, with reference to specialized sources in each field, concludes with several key findings, including the significant contribution of Islamic civilization to pharmacy and toxins, benefiting many other nations from these efforts.

KEYWORDS: Arabs, Drugs, Medicine, Pharmacy, Toxicology.

### **1-INTRODUCTION**

Among the blessings of Allah, the Exalted, upon all His creation, especially the children of Adam, is that He has made them inhabit the Earth and filled it with everything they need for a dignified life. They benefit from its blessings, engage in building it through marriage, reproduction, and multiplication. Allah has endowed the Earth with water, food, clothing, and shelter. He has clarified for humans what harms them and what benefits them, urging them to do what is beneficial and warning them against actions that are harmful.

Humans are the most significant living beings on Earth because they possess intellect and articulate speech. Therefore, they are entrusted with the commands and prohibitions ordained by Allah through the prophets and messengers, conveyed through divine scriptures. In moments of weakness, when afflicted with diseases affecting any part of their bodies, humans seek remedies. Thus, Allah, in His wisdom, created medicine as a cure for any ailment that afflicts them.

The science of medicine, the profession dedicated to examining the human body, identifying diseases or pains, diagnosing them, prescribing remedies believed by physicians to cure the illnesses, appeared very early in human history. Concurrently, the science of pharmacy emerged, detailing the types of medicines, their sources (plants, animals, or minerals), determining their quantities, characteristics, and effects, among other things. Medicine and pharmacy are intertwined sciences and professions that extend deep into human history worldwide. Since the advent of civilizations on Earth, humans have known medicine and pharmacy.

There are no people in the world who have not known medicine and pharmacy, needed them, or contributed to them through diverse efforts. Diseases and medicines were discovered, properties and compositions of medicines were known, and the benefits and harms of medicines were understood. Plants and herbs that treat numerous diseases were found, including those that afflicted humanity in ancient times. The occurrence of poisoning through ingested or drunk toxins, skin-related injuries, or injuries resulting from bites by snakes, scorpions, insects, or animal bites have been challenges throughout history. Scientists exerted great efforts to treat such diseases, and Arab and Muslim scientists made significant contributions in areas like description, discovery, composition, and treatment. They contributed with numerous works that filled manuscript libraries worldwide. This research explores the efforts of Muslim scientists in treating toxins, both practical and theoretical, highlighting prominent Muslim scholars in this field, the most notable works written on this subject, and their scientific value, illustrating the expertise of Muslim pharmacists or herbal scientists in this field.

### 1.1: Study System:

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This study adopts a descriptive-analytical-historical approach. It is based on a theoretical exploration of the efforts made in the field of pharmacy in general and toxicology in particular by Arab and Muslim scholars. The study does not delve into criticizing these efforts or passing scientific judgments on them.

### 1.2: Research Problem:

The research problem lies in the fact that the science of pharmacy has a rich historical background and a geographical spread across various parts of the world. It is indispensable for nations, and all peoples, regardless of their races, locations, or religions, have contributed to it. The Islamic nation, whether composed of Arabs or others, has played a significant role in this field. These contributions include theoretical aspects such as authorship as well as practical aspects like collecting drugs, formulating them, and treating with them. Arabs and Muslims have reached a considerable level of expertise in compiling knowledge about toxins, their causes, and methods of treatment. Undoubtedly, showcasing and introducing these efforts not only enriches the scientific library with a significant heritage but also benefits professionals in the fields of toxicology and pharmacy in general.

### 1.3: Research Hypotheses:

This research aims to present the following hypotheses and questions:

- 1. What is the definition of the science of pharmacy & its importance? and the foundations on which it is based?
- 2. What are the prominent efforts made by Arab and Muslim scholars in the field of pharmacy in general?

3. What are the notable contributions of Arab and Muslim scholars in defining toxins, their causes, types, and methods of treatment?

4. What is the significance of heritage publications on toxins for the scientific, medical, and pharmaceutical libraries in the present age, and how can they be utilized?

### 1.4: Research Objectives:

The research aims to answer the aforementioned hypotheses and questions as follows:

1. Define the science of pharmacy, highlighting its theoretical & practical significance and the foundations on which it is based.

2. Shed light on a selection of efforts by Arab and Muslim scholars in pharmacy, considering them as extensive historical and geographical contributions.

3. Highlight aspects of Arab and Muslim interest in toxins, addressing their prevention, treatment, classification, and definition.

4. Explain the value of publications authored by Arab and Muslim scholars in the field of toxins, and discuss how they can be beneficial in the present age.

### **1.5:** Significance of the Research and Reasons for its Selection:

The significance of the research and the reasons for its selection can be summarized in the following points:

1. Pharmacy is a vital life science for all humans, and it is essential to monitor and understand all the efforts made in this field.

2. Manuscript libraries in the East and West are rich with hundreds of works on pharmacy in general, and toxins in particular. Many of these were written by Arab and Muslim scholars, necessitating their highlighting and introduction.

3. The Arab and Islamic heritage related to pharmacy, in general, and toxins, in particular, requires utilization in the modern era where diseases have spread, and afflictions harming human life have increased.

4. The researcher's interest in studying this topic due to his fascination with Arabic medical literature and his previous efforts in editing some manuscripts from the Arab medical heritage.

### 1.6: Research Scope:

The research scope is twofold: objective boundaries, which include the efforts of Arab and Muslim scholars in pharmacy in general and the treatment of toxins specifically, through the Islamic heritage that extends geographically over a wide area. Temporal boundaries encompassing these efforts over fourteen centuries, from the first century until the end of the fourteenth Hijri century. The research does not have geographical boundaries.

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### 1.8: Research Methodology:

This research adopts a descriptive-analytical approach, shedding light on the science of pharmacy, its importance, and the Islamic Sharia's stance towards it. It then delineates the efforts of Arab and Muslim scholars in one of its domains, specifically the treatment of toxins. The research will present a selection of these efforts chronologically based on the authors' dates of death. The study relies on specialized references in each field, particularly indices of books and sciences, Arabic medical literature, biographical and historical books, with a comprehensive review of relevant sources.

# 2. FIRST SECTION: DEFINITION OF PHARMACY, ITS FOUNDATION, AND THE EFFORTS OF ARABS AND MUSLIMS THROUGHOUT HISTORY

### 2.1. Firstly: Definition of Pharmacy and its Foundations:

The term "sīdālah" (pharmacy) or "sīdānah" refers to medications, as stated in some contemporary Arabic dictionaries. The science of "sīdālah" (pharmacy) explores drugs, their properties, the composition of medicines, and related aspects. "As-Sidaly" (a pharmacist), or "As-Sidalany" as singular, is the one who prepares and sells medicines and drugs, its plural is "ṣayadilah." (Omar, 2008, 2/1340,1341, Doozi, 2000, 6/489)

And perhaps the first to define the terms of "sīdālah" "pharmacy" or "Sidaly" (a pharmacist) was the Arabic scholar Al-Bairuni (Abu al-Rehan Muhammad ibn Ahmad, died 440 AH), who expressed it as "as-Sīdānah." He authored a well-known book on the subject titled "As-Sīdānah fi At-Tibb" (Pharmacy in Medicine) (Blūt, n.d., 4/2534).

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He mentioned that the Arabic term "As-Saydālah" is an Arabization of the Indian word "jandala." He explained that Arabs were accustomed to transforming the letter "jīm" in foreign languages into "ṣād" in the Arabic language. He defined "As-Sidaly" a pharmacist as "a professional in collecting medicines, preserving them, and testing the best among them in terms of quality" (Ṣawāliḥah, Ansam etc, 2012, p. 47).

During the eighth and ninth centuries of the Hijri calendar, the profession of pharmacists was used to refer to those who sold drinks and drugs. They were known as "Ash-shurābātiyah" and "al-'aṭṭārīn" (Al-Maqdisi, 1996, 2/422). Some contemporary encyclopedias followed this nomenclature, as did Muhammad Fareed Wajdi in his encyclopaedia when he defined pharmacy as the sale of perfumes and medicines, and the pharmacist is the one who sells these items (Wajdi, n.d., 5/594-595).

Pharmacy is both a science and a profession. Many scholars in the past combined authoring in the field, teaching it, and practicing it as a profession. Throughout the history of nations and peoples, most physicians seldom found a doctor without a share of pharmaceutical knowledge, practical engagement, or the composition of books and articles on the subject. Some individuals excelled in pharmacy more than in medicine.

When we look at pharmacy, we find that it relies on the sciences of botany and chemistry because most medicines are either botanical or chemical. This does not mean limiting it to just these, as there are also medicines of animal and mineral origin. However, generally, there is significant interest in the sciences of botany and chemistry among Arab and Muslim scholars. According to Dowaidry (2000), it is notable that they distinguished between the science of botany, which is more theoretical, and the science of pharmacy, which is more practical, even though they share common aspects.

For example, we find As-Sūrī (Rashīd al-Dīn ibn Abī al-Faḍl ibn Ali, died 639 AH), one of the eminent botanists in Islamic civilization. His approach to the study of plants was comparable to contemporary methods. Ibn al-Biṭār (Abdullah ibn Ahmad al-Māliqī, died 646 AH) was one of the most skilled pharmacists in the seventh century of the Hijri calendar, and his book in this field is well-known (Dowaidry, 2000, p. 89).

Muslims became renowned for their expertise in the production of therapeutic drugs, which became sought after by various countries worldwide. The trade of pharmaceuticals exported from the Islamic world flourished, as people witnessed their benefits and effects. Their medications were sent to Europe, Africa, China, and India, with the importation of medicines from Islamic lands being a crucial element in trade between these lands and Italy (Habannakah, 1998, p. 565).

Some researchers have mentioned that Muslims advanced the sciences of botany and discovered medicinal drugs, contributing to the development of medical science and the control of diseases. Some medications still have Arabic names, indicating the influence of this civilization on Western civilization. The excellence of Muslims in the field of pharmaceuticals is attributed to their knowledge of chemistry, a science in which many Muslims excelled. They studied it in the universities of Al-Andalus and some universities in the East (As-Sanidi, 2008, p. 381).

### 2.2. Secondly: Bright images of the efforts of Arabs and Muslims in pharmacy:

Ibn Juljul (Abu Dawood Hasan ibn Sulaiman, died in 377 AH) was one of the renowned physicians during the caliphate of Hisham ibn Al Mo'ayad Billah (died in 403 AH). He possessed extensive experience in pharmacy, interpreting the names of medicines mentioned in the Greek book of Dioscorides. (Ibn Abi Usaybi'ah, n.d, 1250, p. 494).

Dioscorides Pedanius, a famous Greek physician, lived during the 1st and 2nd centuries CE. His notable work had various titles, with the most famous being "De Materia Medica" or "On Medical Material," also known as "Kitab al-Hasha'ish", "The Book of Herbs and Medicines." Or "Dioscorides book of Single Medicines". It was translated into Arabic during the time of Caliph Al-Mutawakkil.

Ibn Zahr Al-Ashbily (Abu Marwan Abdul-Malik ibn Muhammad ibn Marwan, died in 525 AH) was an adept physician in the field of pharmacy. He authored the book "Kitab al-Adwiyah al-Mufradah" (The Book of Single Medicines) and wrote an article responding to Abu Ali ibn Sina in some aspects of his book "Al-Adwiyah al-Mufradah" and a letter on the composition of medicines. (Ibn Abi Usaybi'ah, p. 519).

Al-Kindi (Ya'qub ibn Ishaq ibn al-Sabbah, died around 260 AH) is considered the first to use the distillation and filtration methods in purifying medicines. He was also the first to establish a system for determining drug dosages in treatment, he was interested in specifying their quantities and times of administration. (Ṣawāliḥah, Ansam, etc., 2012, p. 52).

Among the efforts of Imam Ar-Razi (Muhammad ibn Zakariya, died in 313 AH) is his mention in his book "Serr Al-Asrar" of the instruments used in preparing medications. This book was translated and published in 1937, indicating Ar-Razi's contributions to the field of chemistry and its role in pharmacy. (Dowaidry, 2000, p. 144).

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The book "Al qanoon fi At-Tib" by the chief physician Ibn Sina (died in 428 AH) remained the primary reference in the field of medicine in Europe for seven consecutive centuries, from the 10th century to the 17th century AD. (Hajou, Hadiya. 2022. "Ibn Sina and His Book 'Al qanoon fi At-Tib ' in Our Heritage Library | Qatar National Library" qnl.qa).

Ibn Sina's "Al qanoon fi At-Tib" included methods for preparing around seven hundred and sixty drugs, along with the names of numerous plants and food substances that could be used to treat poisons, snake bites, insect stings, and more. Additionally, it described poisonous plants and methods of prevention. (Durant, 1988, 13/196; Ṣawāliḥah, Ansam, etc, 2012, p. 45).

Al-Bairuni (Abu al-Rayhan Muhammad ibn Ahmad, died in 440 AH) is considered the first to introduce the term "As-Saydālah" "pharmacy" and express it as "As-Sīdānah " – as mentioned earlier. His famous book on this subject is titled "As-Sīdānah fi At-Tibb", which was published with the supervision of Dr. Abbas Zaryab Khu'i in Tehran in 1991. In this book, Al-Bairuni dedicated significant effort to trace and investigate the names and properties of medicines, citing the opinions of preceding physicians. He categorized medications into three types: medicines, foods, and poisons. He mentioned qualities of those skilled in formulating medicinal compounds, emphasizing that they must be proficient physicians in their craft. Additionally, he spoke about the characteristics of a successful pharmacist. His book served as a comprehensive pharmaceutical encyclopedia that benefitted both the East and the West. (Ibn Abi Usaybi'ah, n.d, 1250, p. 459; Ṣawāliḥah, etc., 2012, p. 47).

Ibn Wafid (Abu al-Mutarif Abd al-Rahman ibn Muhammad, alive in 460 AH) possessed great expertise in the field of pharmacy. He compiled information not matched by anyone in his era and authored an unparalleled book. In it, he gathered content from the works of Dioscorides and Galen (a famous Greek physician who died in 216 CE) on single medicines, arranging them in the best order. Ibn Wafid faced challenges in collecting, organizing, and correcting the names, characteristics, and strengths of medicines, a task that took him around twenty years. (Ibn Abi Usaybi'ah, n.d, 1250, p. 496).

Ibn Ar-Rumiyya al-Ashbili Al-As-Shaab (Abu al-Abbas Ahmad ibn Muhammad ibn Mufarrij, died in 637 AH), was actively involved in pharmacy. He focused on collecting herbs and medicinal plants through his travels and various studies. In Seville, he had a shop where he sold herbs and manufactured medicinal drugs. Imam Shams al-Din Adh-Dhahabi (died in 748 AH) said about him, "He had profound knowledge in plants and herbs, surpassing the people of his time." (Adh-Dhahabi, 2006, 16/315).

Ibn al-Rumiyya's works in pharmacy include "Tafsir Asma' al-Adwiyah al-Mufradah min Kitab Dioscorides" (Interpretation of the Names of Single Medicines from Dioscorides' Book) and an article on the formulation of medicines. (Ibn Abi Usaybi'ah, n.d, 1250, p. 538).

Ibn Al-Bitar (died in 646 AH) was considered the "Chief Herbalist" of his time, equivalent to the modern-day position of "President of Pharmacists" in some Arab countries. He authored the book "Al-Jami' fi al-Adwiyah al-Mufradah," which contained over one thousand and four hundred different medicines arranged alphabetically. This comprehensive work demonstrated intelligence, experience, and extensive knowledge in the fields of botany and herbs. His books were used in establishing the first botanical garden and pharmacy in England during the reign of James I (died in 1625). His book "Al-Adwiyah al-Mufradah" is considered a foundational text in the formation of modern pharmacology. (Al-Mawsu'ah Al-Mujazah Fi Al-Tarikh Al-Islami, n.d,1250, 10/970; Şawāliḥah, Ansam, etc, 2012, p. 44).

Al-Qalansi al-Samarkandi (Badr al-Din Muhammad ibn Bahrab ibn Muhammad, alive in 620 AH) was skilled in treating diseases. He authored the book "Al-Aqrabadhin" (Compound Medicines), which included forty-nine parts covering a comprehensive range of compound medicines. The book incorporated information from various reliable sources, whether Arabic or Greek. (Ibn Abi Usaybi'ah, n.d, 1250, p. 472).

Abd Ar-Rahman ibn Ishaq ibn Al-Haytham (died around 340 AH) was one of the prominent physicians of Al-Andalus, hailing from Cordoba. His pharmacy-related books include "Al-Kamal wat Tamam fi al-Adwiyah al-Musahhila wal Muqayyi'ah", "Al-Ichida' bil-Dawa' min Khawas al-Ashya' ", and a book titled "Al-Sama'im." (Ibn Abi Usaybi'ah, n.d, 1250, p. 494).

Ibn al-Jazzar (Ahmad ibn Ibrahim ibn Abi Khalid al-Qairawani, died in 369 AH) was a renowned physician belonging to a medical family, as his father and uncle were also involved in medicine. He had a significant interest in medicines and their compositions. Ibn al-Jazzar was known for his frequent charitable distribution of medicines to the poor and needy. He conducted urine analysis for some patients before prescribing medicines. His medical legacy includes a notable book titled "Fi al-Adwiyah al-Mufradah," also known as the foundational work for the book "Fi al-Adwiyah al-Murakkabah," and a treatise on the substitution of medicines. (Ibn Abi Usaybi'ah, n.d, 1250, p. 482; Mahfouz, Muhammad, 1994, 2/18).

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Abu Abdullah As-Siqilli al-Maziri (4th century Hijri) grew up in Sicily, learned Greek, and lived in Cordoba during the reign of Caliph Abd Ar-Rahman An-Nasir (died in 350 AH). He was a jurist and had a keen interest in both medicine and pharmacy. As-Siqilli was familiar with the names of drugs and medicines, and he collaborated with a group of physicians in Cordoba to research and correct the names of drugs mentioned in Dioscorides' book. (Ibn Abi Usaybi'ah, n.d, 1250, p. 494; Abbas, Ihsan, 1975, p. 122).

Imam al-Fasi (Abu Zaid Abd Ar-Rahman ibn Abd al-Qadir, died in 1096 AH) composed a poetic work titled "Al-Aqnoum fi Mabadi' al-Ulum," consisting of seventeen thousand verses. In this work, he covered around three hundred sciences, including aspects related to pharmacy such as the science of formulating drugs, substituting drugs, the powers of drugs, and the science of compound medicines. (Al-Kittani, n.d, 1250, 2/138-139).

Some writers mentioned a group of herbalists and pharmacists in Al-Madinah during the 14th century Hijri, noting their significant role, especially among the elderly, in treating various diseases. People would consult them, present their patients' complaints, and these herbalists would gather herbs, prepare them according to the required form (boiling, grinding, or pounding), and instruct on their use. And the desired outcome was achieved by the grace of the Lord of the creation. Moreover, some of them would volunteer to stay awake at night, without any monetary compensation, in order to serve those in need during the night. This was before the abundance of doctors, hospitals, and pharmacies. The herbalist shops at that time served as pharmacies. (Al-Khayyari, 1992, pp. 202, 204).

One of the most famous books on pharmacy in the Arab heritage that must be mentioned here is the massive work authored by the physician Dawud al-Antaki (d. 1008 AH) titled "Tadhkirat Uli al-Albab wa al-Jami' li al-Ajab al-Ujab" or famously known as "Tadhkirat Dawud." Dawud was a skilled blind physician who travelled extensively, and his book is considered valuable in the fields of medicine and pharmacy.

The author dedicated a part of his book to the laws of individualization, composition, and his specific practices. In this part, he discussed the conditions of single and compound materials, along with pharmacy laws. This included processes such as grinding substances, frying them, or boiling them in water, among other related matters.

His meticulous efforts in drug manufacturing and preparing medicinal compounds are evident in his consideration of two important elements: the first: the time of collecting herbs and preserving them to prevent corruption, the second: the locations of medicines.

In the third part of his book, Dawud compiled a list of drugs and other items alphabetically, incorporating hundreds of names of plants, animals, and drugs derived from them or from chemical elements or salts. He provided detailed descriptions and discussed their characteristics precisely. Noteworthy is the book's inclusion of names in multiple languages, stating in Arabic, Persian, and Nabatean. (Hafez, Mahmoud. (2006). 14/7.)

**I said:** I have read this book multiple times and referred to it in various research studies related to medical issues or the critical edition of certain medical manuscripts. The book has been printed in several early editions, and in its oldest prints, you find an appendix written by one of his students, known as "Zayl At-Tadhkirah." On its margins, there is a treatise on treating diseases titled "Al-Nuzhah al-Mubhijah fi Tashhizh al-Azhan wa Ta'dil al-Amzijah." Many herbalists, those interested in drug composition, and herbal collectors rely on this book.

### 2.3. Thirdly: Oversight of Pharmacists (Monitoring Pharmacists) in Islamic Civilization:

The practice of pharmacy was not left unregulated; rather, it was subject to state control through a system known as "Al-Hisbah." This was considered one of the duties of rulers, governors, and their deputies in various Islamic states throughout different eras. There was a clear focus on monitoring pharmacists, herbalists, and compounders, regardless of the names given to them. Oversight included aspects such as composition, distribution, and other matters, given the direct impact on human health and life.

Scholars of Sharia political in various Islamic states throughout different periods paid attention to professions like pharmacists, herbalists, and compounders (those involved in preparing medicinal drinks). They were monitored and held accountable by Hisbah authorities. Conditions were set for them, and rules and regulations were established for their adherence. This was done due to the critical nature of these professions, given their connection to human health and well-being.

Imam Ash-Shayzari, a scholar from the 6th century Hijri, dedicated a part in one of his books titled "Al-Hisbah a'la As-Sayadilah." In this section, he discussed various forms of deception and fraud in these professions. He outlined what pharmacists should adhere to and the responsibilities of those overseeing them. He said: (Drugs and drinks are of different natures and mixtures, and treatment depends on their mixtures. Some of them are suitable for a disease and mixture, but if something else is added to them, it changes them from their mixture, and they inevitably harm the patient. Pharmacists must watch God Almighty in this and

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those responsible for oversight were urged to warn, advise, and enforce punishment and penalties. He also highlighted the need for regular audits of their medications every week. (Al-Shayzari, n.d, p. 41 and beyond).

In another part, Al-Hisbah a'la Ash-Sharabiyeen:

It was mentioned that compounders should only formulate medicinal drinks or prepare mixtures if their knowledge and expertise are well-known, and their experience and trial in the field are extensive. The oversight authorities stressed that medications should only be formulated using well-known substances and recognized compositions. It was deemed the duty of those overseeing to visit them monthly to ensure the safety, quality, and integrity of their medicinal formulations, checking for any fraud, damage, or corruption...etc. (Al-Shayzari, n.d, p.56-58)

In a third part, Al-Hisbah a'la Al-Attareen (Sellers of Fragrances):

It was explained that various forms of deception exist in the perfume trade due to the diversity of scents and types of perfumes. The alignment of medicinal compounds and their olfactory similarity were highlighted. It was emphasized that medications are usually purchased individually from perfumers and then combined. The ignorant might buy a compound, thinking it is the desired product, and sell it to another uninformed person who uses it as medicine, unaware of its adverse effects. This poses more harm to people than other deceptive practices since medicinal compounds vary in their nature. (Al-Shayzari, n.d, pp. 121-122).

### 2.4. Fourthly: Western Attitude towards Arab and Islamic Efforts in Pharmacy:

Throughout various centuries, the West demonstrated interest in the efforts exerted in pharmacy by Arab and Muslim scholars and benefited practically, theoretically, and academically for many centuries, just as they benefited from the Arabs in medicine, and perhaps more. Many Western scholars praised their Arab and Muslim counterparts for their advancements in medicine and pharmacy. Examples include:

The college of Medicine in Salerno, Italy, taught medicine and pharmacy in both Arabic and Latin for about 900 years. In the thirteenth century, Italy saw the emergence of medical schools that integrated the three famous medical traditions: Greek, Arabic, and Jewish. These traditions were absorbed entirely, forming an entirely new medical heritage that became the foundation of modern medicine. During this period, they imported numerous medications from Islamic countries, retaining their Arabic names (Durant, 1988, 17/190).

The Pharmaceutical Society in England recognized two individuals as the greatest contributors to the field of pharmacy: the Greek Galen and the Arab ibn Sina (Dowaidry, 2000, pp. 89-90).

German physician and chemist "Otto Fritz Meyerhof" (d. 1951) mentioned, "Arab pharmaceutical science persisted in Europe until the mid-nineteenth century. The world's first pharmacy was opened in Italy, and the shift from herbs to powders, tablets, and syrup only occurred after chemistry flourished in the nineteenth century".

Durant (1988, 13/187) mentioned that Muslims were almost the pioneers in inventing chemistry as a science. Muslims introduced precise observation, scientific experiments, and meticulous documentation of results in a field that, as far as is known, the Greeks had limited industrial experience and vague assumptions. Muslims performed countless chemical analyses, wrote treatises on stones, distinguished between alkaline and acidic substances, explored inclinations of materials, studied hundreds of medicinal drugs, and formulated hundreds of them.

Durant also noted that surgical medicine was considered one of the weaker branches of Islamic medicine. However, therapeutic medicine and the properties of drugs were stronger among Arabs and Muslims. They added plant materials and other essential substances to the science of compound drugs, introduced new medicinal compounds, established the first drug stores and pharmacies, founded the first pharmacy school, and wrote significant treatises in the field of Aqrbadheen. Importing Arab drugs became one of the most important commercial activities between Italy and the Middle East (Durant, 1988, 13/189).

In the 1960s, specifically in 1964, Europeans and Americans began to reexamine the book "Tadhkirat Dawud al-Antaki (d. 1008 AH)" to benefit from its information on plants with medicinal uses (Dowaidry, 2000, p. 90).

The preceding information only scratches the surface of the extensive efforts undertaken by Arabs and Muslims in the field of pharmacy. This overview provides a glimpse into their significant contributions.

and the next section will discuss some of their efforts in toxicology, focusing on poison-related contributions.

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## 3. THE SECOND SECTION: NOTABLE EFFORTS OF ARAB AND MUSLIM SCHOLARS IN STUDYING AND TREATING POISONS

Arab and Muslim scholars played a significant role in the study of poisons and related aspects, whether in terms of their classifications and the identification of types based on various considerations, or in elucidating their effects on the body.

Furthermore, they clarified the medicines used to treat poison and the methods of treatment. This is evident in their medical or general pharmaceutical works, as well as in specific toxicology texts (whether original compositions or translations from other languages). In this section, I will highlight examples of these efforts as follows:

### 3.1 Definition of Poisons, Their Classifications, Effects, and Treatment in Light of Western and Arab Perspectives:

In linguistic terms, the word "سلاست" (As-Sammu) (pronounced "sam") has various forms such as "السَنَّمُ" (As-Simmu) (with a short vowel), "السَنَّمُ" (with a kasra), and "السُنُّمُ" (As-Summu) (with a damma), with the common meaning being "the killer." The word is pluralized as "سَمَا (Semam) (with a kasra), and anything poisonous, i.e., something containing poison. It is said, "سَمَا "meaning he poisoned it, and "سَمَا الطعام" (means he contaminated the food with poison (Ibn Manzur, 1993, 312/303). The technical meaning of poison does not deviate from its linguistic sense.

In one of the American medical dictionaries, poison is defined as (Animal, vegetable, or mineral substance which, when applied externally, or taken into the stomach, or circulatory system, operates such a change in the animal economy as to produce disease or death)

### (J. Thomas. M.D (1865.P:431).

### 3.2. Efforts of Muslims and Arabs in the Study of Poisons:

Given the diverse symptoms, causes, and types of poisons, as well as the various medications available, Arab and Muslim scholars dedicated significant efforts to the study of poisons. They delved into the description, classification, types, symptoms, and effects of poisons, elucidating these details from a theoretical perspective.

They documented this knowledge in their general medical books or specific works and dissertations focused on toxins. Furthermore, they applied these studies practically to extract poisons from the body and discover substances for their treatment. They categorized poisons based on several considerations, including their causes and stages. They also examined the classification of poisons according to their plant, animal, or mineral sources. They studied the conditions of the poisoned individual and the effects or changes occurring in the body based on the type of poison, the person's physical condition, and the most suitable methods for treating the poisoned individual. They provided guidance on actions to be taken after vomiting or purging the poison, especially if the poison was ingested as a drink or food, among other considerations.

Here, I will briefly mention some examples and models of these efforts:

### 3.2.1. Classification of Poisons:

The physician Ali ibn Sahl ibn Rabban At-Tabari (d. 247 AH) mentioned that poisons can be classified into multiple categories based on their nature and source. He categorized them according to their nature, including plant-based poisons, resinous substances, seeds, veins, and substances that flow in the saliva of certain animals like snakes and dogs. Additionally, he included poisons found in the tail of some insects like scorpions and locusts, as well as those present in the proboscis of certain insects like wasps (Ibn Abi Usaybi'ah, n.d., p. 414; Sawalha, 2012, p. 49).

The Andalusian physician Az-Zahrawi (Abu al-Qasim Khalaf ibn Abbas, d. 427 AH) mentioned in his famous book "At-Tasrif li-man 'Ajiza 'an al-Ta'lif" that substances causing poisons can be divided into three categories: mineral, plant-based, and animal-based. He also elaborated on the quantities that can lead to poisoning, aligning with the earlier statement made by the physician Jabir ibn Hayyan, who lived less than two centuries before him (Sawalha, 2012, p. 47, p. 51).

The renowned physician Ibn Sina stated that poisons, in terms of their nature, can be divided into two categories: those acting in a specific manner on the toxic substance itself and those acting in their form and the entirety of their essence. He explained that the first category can result from consuming spoiled food, a substance heating to the body, a narcotic, or a substance blocking respiratory pathways. The latter category includes the names of some lethal poisons, such as the bile of a tiger (Ibn Sina, n.d., 3/282). **3.2.2. Description of the Effects of Poisons on Humans:** 

Arab physicians documented the effects of poisons on the human body, observing the changes that indicate the presence and type of poison. Ibn Sina, for instance, stated that the occurrence of sensations resembling stinging, cutting, and colic in a person indicates exposure to poisons such as arsenic and mercury, which are toxic metals. In cases where severe inflammation, profuse sweating, redness in the eyes, and thirst occur, it suggests poisoning by a heat-inducing substance like phorbol (characterized as

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herbaceous and woody plants containing a toxic milky substance and a caustic, rubbery material. In Egypt and the Levant, it is referred to as "اللبانة المغربية" (al-Lubānah al-Maghribiyyah). If a person consumes about three dirhams of this substance, it can lead to their death). (Ibn Sina, n.d., 3/289; Ibn al-Baytar, 2001, 3/216).

Additionally, symptoms of numbness and coldness in the body signify exposure to narcotics, while weakness, cold sweats, and fainting indicate poisoning by substances antagonistic to the human body's defenses, representing some of the worst types of poisons (Ibn Sina, n.d., 3/282-283).

Physician Abu Al Qassem Az-Zahrawi mentioned some symptoms of poisoning according to the toxic substance ingested, including general symptoms such as lethargy, facial pallor, limb coldness, spasms, and redness of the eyes. These symptoms vary in intensity and weakness depending on the specific poison and the affected individual (Sawalha, 2012, p. 51).

By consulting some contemporary medical dictionaries, it becomes apparent that Western classifications of poisons and their effects align closely with those mentioned by Arab and Muslim scholars. They categorized poisons into four types:

A- Irritant poisons, or those which pro-duce irritation, or inflammation, as the mineral acids, oxalic acid, the caustic and Alkalies.

B - Narcotic poisons, or such as pro-duce stupor or delirium, as opium, Hyoscyamus, etc.

C- Sedatire poisons, or those which di- erectly reduce the vital powers, as hydro-cyanic acid, c3- anide of potassium, sul- Phu retted hydrogen and other of the poisonous gases .

D- Acro-narcotic and Acro-sedative poisons, including those which produce sometimes irritation, sometimes narcotism (or sedation), or both together. (Thomas.M. D., 1865.P:431).

### 3.2.3. Medicines for Poisons and Their Classifications:

Arab and Muslim physicians were concerned with listing medicines for poisons and their various classifications, as well as their effects in treating poisonings. The medicines they mentioned can be categorized into three main elements: botanical, animal-based, and mineral. While this general classification was mentioned by more than one physician.

they also employed other methods of categorization. For instance, the renowned physician Ibn Sina mentioned that medicines taken to counteract poisons could be aimed at breaking down the toxicity of the poison and redirecting its essence, such as in the case of milk. Alternatively, the intention might be to expel the poison's essence, as seen in certain remedies he mentioned. Some medicines aim to confront the poison's characteristics directly, like drinking a solution containing garlic for a scorpion sting. Ibn Sina then highlighted a range of medicines common to both poisons and other ailments, emphasizing that these medicines counteract the poison, preventing it from reaching the heart. Numerous examples were provided (Ibn Sina, n.d., 3/284 and beyond).

### 3.2.4. Methods of Poison Treatment and Their Gradation:

Many Arab physicians discussed various methods for treating poisonings based on the patient's condition and the type of poison ingested or encountered. For example, the physician Abu al-Qasim Az-Zahrawi mentioned that the general treatment for poisoning involves inducing vomiting and diarrhea. This means administering substances that lead to the patient vomiting or experiencing diarrhea. Additionally, the patient may be given diuretic substances and can be treated with injections or compresses on the abdomen. Feeding the patient with fatty foods is also recommended (Sawalha, 2012, p. 51).

### 3.2.5. Some ways to guard against poisons:

1. Ibn Sina mentioned that anyone seeking protection from poisoning should consider the following:

A. Avoiding foods with dominant tastes of acidity, saltiness, bitterness, or sweetness, and those with strong odors. The reason is that these foods mask the smell and taste of poisons, making it difficult to detect them.

B. Guarding against leaving food or drink containers uncovered or in open spaces, as reptiles or insects may fall into them, leading to food poisoning (Ibn Sina, n.d., 3/281).

2. The physician Al-Qusuni, a senior doctor in Sultan Qansuh Al-Ghuri's court, mentioned in his book "Kamalu Al-Farha Fi Daf' As-Sumum Wa Hifdh As-Sihah" in the first chapter ways to prevent the consumption of poisonous foods and what to do in case of poisoning (Al-Qusuni, 2008, p. 156 and beyond).

### 3.2.6. Some moral and sensory indicators of the presence of poison:

Some Arab and Muslim doctors have also emphasized dealing with poisons in terms of prevention and treatment. They mentioned certain signs and characteristics that appear in individuals who offer poisoned food or drink to others, and how to recognize them. Although this is not within the medical specialties, as it relies on matters of suspicion, intuition, and insight, they have paid attention to it, especially in books written for kings, sultans, and the like, or books authored by their personal physicians.

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For example, Al-Qusuni mentioned a chapter in his book about signs of suspicion and accusation that appear on the faces and behaviors of those who offer poisoned food or drink, and the impact of that in detecting the poison. In another chapter, he listed the names of some animals and birds, their characteristics, and how they can be used to infer the presence of poison in food or drink, advising to raise them in homes and palaces (Al-Qusuni, 2008, pp. 196-200).

### 3.3 Books by Arabs and Muslims on Poisons: Authoring and Translation

The libraries of manuscripts are filled with numerous books and writings by Muslim scholars from the Arab world and beyond, addressing poisons, methods of prevention, treatment, and translations from languages other than Arabic, such as Greek, Persian, or Indian. These works represent a valuable treasure in the heritage of Arabs and Muslims in the field of pharmacy. If given the opportunity for extraction, investigation, refinement, publication, and translation, these works could contribute significantly. Here, I will list some of these works as follows:

### 3.3.1 Firstly: Some Arabic Works:

*As-Sumum* by Jabir ibn Hayyan (d. 197 or 200 AH): A precious manuscript found in the Timurid treasury, from which the late Dr. Saroof extracted several articles of great importance, as mentioned in the journal "Al-Muqtataf" parts 58 and 59. Some researchers suggest that this is the only known copy of the book to date (Sarkis, 1928, 2/665, 2/1207, Blout, n.d., 1/755).

*Risalah fi Ashfiyat As-Sumum* by Al-Kindi the physician philosopher (ya'cob bin Ishaq bin As-Sabbah bin Imran, d. 256 AH (Ibn An-Nadim, 1997, p. 318, Ibn Abi Usaybi'a, n.d., p. 291).

*As-Sumum* (Two Articles) by Isa bin Ali al-Baghdadi (d. 358 AH): The Physician of Al-Mutawakkil Ala Allah and Al-Mu'tamid al-Abbasī, a student of Haneen bin Ishaq, a renowned physician (Al-Babani, 1951, 1/806).

*Al-Munqidh min al-Halakah fi Daf' Madaar As-Sumum al-Muhlikah* by Ibn al-Mubarak (Hussein bin Abi Tha'lab bin al-Mubarak, physician who died after 488 AH): Written for a minister in 484 AH, the book consists of three articles, with a copy found in the Chester Beatty Library (Haji Khalifa, 1941, 2/1869, Blout, n.d., 2/911, Al-Habshi, 2004, p. 581).

As-Sumum by Al-Bayhaqi (Ali ibn Abi Al-Qasim Zayd ibn Muhammad ibn Al-Hussein, died 565 AH) (Al-Babani, 1951, 1/700)

Madatu al-Hayah wa Hifz al-Nafs min al-'Afaat fi Anwa' As-Sumum wal-Masmumati by Al-Farisi (Muhammad ibn Abi Bakr, died 677 AH). A copy exists in the Chester Beatty Library, written in 883 AH, numbered 4004 Brokleman 5:185 (Al-Habashi, 2004, p. 581).

**Risalah fi As-Sumum** by At-Taimi Al-Farisi (Muhammad ibn Abi Bakr ibn Muhammad ibn Abi Bakr ibn Hasan, died around 677 AH or, in some references, 697 AH) (Blout, n.d., 4/2492)

**Kamal al-Farahah fi Daf' As-Sumum wa Hifz al-Sihah** by Al-Qusuni the physician (Mohammed ibn Mohammed Al-Qusuni, the physician, died 931 AH) the chief physician of Sultan Qansuh Al-Ghuri. The book was verified by Dr. Mohammed Shafi'i Muftah and published by Dar Ghuras in Cairo in the year 2008. It consists of 224 pages (Al-Babani, 1951, 2/231; Muftah, 2008, p. 22 and beyond).

And contains two sections: the first on health preservation and marital relations, and the second on repelling poisons. This section consists of seven chapters covering prevention of consuming poisoned food, signs identifying those who may offer poisoned food, signs identifying poisoned food, signs of poison on the consumer, mention of the properties of gemstones, single beneficial medicines, and mention of antidotes and pastes .

**Risalah fi al-Hayawanat Dhawat As-Sumum wa Ta'thiratha wa Ilajaha** by Hakim Al-Malik (Ahmad ibn Ali Nizam Ad-Din Al-Kilani, the logical philosopher physician, died after 1155 AH) (Blout, n.d., 1/394).

**Risalah fi As-Sumum wa At-Tasammum** by Isa Elias Farah Ad-Dimashqi (died before 1290 AH). A copy of it is found in Al Maktabah Az-Zahiriyya In Damascus, Syria, number 4369B (Blout, n.d., 3/2328).

Hadiyat Al-Muhtaar wal-Najatu min al-Adrar fi Ma'rifat As-Sumum wa Adwiyyatiha by Ash-Shabasi (Mohammed ibn Mohammed, died 1312 AH). The translator physician from Al-Azhar. A copy is available in Al Maktabah Az-Zahiriyya In Damascus, Syria, with numbers 7322, 7323, 7324 (Blout, n.d., 5/3081)

Nuuzhat al-Fuhum fi Tahlil As-Sumum (in Turkish) by Katib Zade (Mohammed Nuri Ar-Rumi Al-Barkawi, the Ottoman physician, died 1249 AH) (Al-Babani, n.d., 4/640, Blout, n.d., 5/3320).

*Al-Jawhar Al-Maknun* by Al-Jaza'iri (Abdul Razzaq ibn Muhammad ibn Hammadoush, died around 1200 AH). It consists of four books: the first book on poisons and Insects and Reptiles, the Venomous Ones, and their treatment; the second book on (Theriacum) and what is going on; and some pastes that one may need. The third book on diseases structured based on the table of

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Haneen ibn Ishaq. The fourth book is dedicated to explaining the terms and their Arabic equivalents (Abu Al-Qasim, 2007, 2/425, 428).

### **3.3.2 Secondly: Some Translated Works:**

**Translation of** *Shanaq Al-Hakim fi As-Sumum wat-Tiryaq* by Al-Jawhari (Abbas ibn Saeed, died 218 AH). The original book is in the Indian language by an Indian physician named "Shanaq." It was translated into Persian by a man named "Munkah Al-Hindi," then explained by a Muslim man named Ibn Hatim Al-Bakhli to Minister Yahya ibn Khalid Al-Barmaki (died 163 AH). Later, it was translated for Caliph Al-Ma'mun by the previously mentioned Al-Jawhari. A copy of it exists in the Institute of Arabic Manuscripts in Cairo, numbered 530, another copy in Dar Al-Kutub Al-Masriyah, numbered 60 medicine, and a copy in Al Maktabah Az-Zahiriyya In Damascus, Syria, numbered 3163 (Haji Khalifa, 1941, 2/1425, Blout, n.d., 2/1324, King Faisal Center, n.d., 84/167).

*Al-Felaha An-Nabatiya* by Ibn Wahshiya (Ahmad ibn Ali ibn Qais ibn Al-Mukhtar, died 296 AH). It is a translation of the book 'Al-Sumum' by Yarbuqa Al-Nabati Al-Kasrani Al-Fuqai'i, translated from Nabati to Arabic by Abu Bakr Ahmed ibn Ali, known as Ibn Wahshiya, and titled it "Al-Falaha Al-Nabatiya." It is divided into five parts and was dictated to some scholars of his time in the Arabic language. It includes mentions of books on poisons from various ancient nations (Haji Khalifa, 1941, 2/1425, Fendik, 1869, p. 230).

In conclusion, it can be said that tracing such efforts and attempting to explore them in a brief study is a form of negligence and lack of fairness towards them. What the scholars of Arab and Islamic civilization have recorded in their writings, the legacy they left behind, the sciences they established, and the theories or materials they discovered, especially in the fields of medicine and pharmacy, represent a significant service to humanity. Therefore, further efforts are warranted to uncover this vast scientific wealth so that humanity can benefit from it in the present age.

What I have presented in these pages is merely a modest effort. I ask Allah, the Most High, to place it in the balance of my good deeds, to reward me generously for it, and to make it beneficial to those who read it. May He forgive any mistakes or shortcomings on my part. Allah is the one who grants success and guides to the right path.

### 4. RESULTS AND DISCUSSION

After completing this research, which addressed Arabs and Muslims in pharmacy in general, and toxins in particular, I have reached the following results and recommendations:

### **Firstly: Results:**

Pharmacy combines both knowledge and profession, encompassing theoretical and practical aspects.

Pharmacy is closely related to medicine, with its history intertwined with the history of medicine. Both are connected to human life and health, as wherever there is disease, there is medicine, and accompanying it, pharmacy.

All nations and peoples have contributed to pharmacy, whether in the discovery, composition, description of properties, or dosage and effects of medicines.

Arabs in general and Muslims in particular have played a significant role in the flourishing and advancement of pharmacy, both theoretically (education, authorship, translation) and practically (composition, practice).

The West has recognized the skill of Arabs and Muslims in establishing the science of pharmacy and its prosperity. They studied many Arabic pharmacy books, such as the works of Ibn al-Bitar, incorporating them into their modern theories and studies of medicines and their compositions.

Toxins are harmful substances that affect humans through ingestion or contact, potentially causing severe illnesses or even death. They have been recognized by humans throughout different centuries and across various nations and peoples.

Toxins can be categorized based on their source, effects, method of intake, or their impact on the body.

Arabs and Muslims have contributed significantly to the study of toxins, their sources, classifications, methods of identification, effects, treatments, and preventive measures.

Arab and Muslim physicians and pharmacists have left a rich legacy of theories related to toxins and the formulations of drugs for their treatment. Their pharmaceutical or medical works often included dedicated sections on toxins, as seen in the book "Al qanoon" by the prominent physician Ibn Sina.

Manuscript libraries in the East and the West abound with numerous books on toxins authored or translated by Arab or Muslim scholars. They enriched these works with their theories and studies.

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### Secondly: Recommendations

Invest scientific efforts in extracting the treasures from manuscript libraries written in the Arabic language in the fields of medicine and pharmacy, and work on their verification to benefit from them in the present age.

Familiarize students and researchers with the substantial contributions of Arabs and Muslims in pharmacy, enlightening them on the theoretical and practical aspects of utilizing this knowledge.

Clarify any confusion and dispel misconceptions that many researchers may fall into, being enamoured with Western scientific advancements in medicine and pharmacy. Emphasize that many foundations of this progress are rooted in the efforts of Arab and Muslim scientists, physicians, and pharmacists throughout different centuries.

Conduct studies on toxins and related fields, considering them as a vast area that intersects with various disciplines (medicine, pharmacy, criminology, forensic medicine, etc.). Utilize the efforts of Arabs and Muslims in this field.

Introduce a scientific course to study the Arabic manuscript heritage, both handwritten and printed, in most theoretical and practical colleges. This aims to acquaint students with the contributions of Arabs to civilization throughout history.

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